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The Brotherhood of Bridge Builders

By Charles M. Spofford

MEN of all countries, of all ranks, of all states, foreigners or citizens, pilgrims or merchants, whether on foot or on horseback, whether poor or rich, whether with carriages, or with horses loaded or unloaded, or with other animals, or in whatever manner they travel, can by virtue of our concession, without being held by any toll, pass freely over this bridge."

SO reads the charter authorizing the construction of the bridge at Tours built in the eleventh century by the Count Eudes "in order to be useful to posterity and consequently agreeable to God."

Following the proclamation of the Council of Arles in 1034 for the re-establishment of peace and the restoration of the Christian faith, the establishment of commercial relations between the countries of Western Europe was facilitated by the construction of numerous bridges across the larger rivers of Italy, Spain, and particularly France.

Their construction was due to the fervent Christian monks and laymen who were inspired by their faith to aid pilgrims and merchants, to cross in safety these dangerous and often nearly impassable rivers, though occasionally a bridge was constructed by a Feudal lord, like Count Eudes.

Funds for these bridges were solicited from members of the Christian faith, stimulated in one case at least by the promise of special privileges to be granted by the Pope. Voluntary contributions of labor were also made by those who wished to render service and the men engaged in their construction formed themselves into associations or brotherhoods.

These brotherhoods were probably originally designated by terms referring to the particular bridge with which they were connected; for example, Brothers of the Bridge of Avignon; but later it became convenient for writers to designate them all by one title; the Latin term *Frates Pontifices*, the French term *Frères Pontifes*, the English term *Brotherhood of the Bridge Builders*, the Latin-English expression *Pontist Brothers*, have all been used.

Many writers have assumed that these various brotherhoods constituted a definite religious order, the members being subject to permanent vows. This belief is perhaps strengthened by the fact that one of the titles of the Pope is "Pontifex Maximus" which may be translated

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Welcome, Miami

ANOTHER Local Section of the Society has come into being. At its January meeting the Board of Direction authorized the formation and approved the Constitution of the Miami, Florida, Section. Welcome, Miami!

The membership of the Society in Florida has changed decidedly in the past few years. In 1922 there were but 84 members of all grades resident there, whereas now the records show 278 with addresses within the State. The foundation of a Section of the Society there should serve to increase the interest of resident members in matters, not only technical, but professional and personal as well.

If numbers had been assigned the several Local Sections, Miami would be No. 46.

"Asheville in April"

A MEETING *en famille*, so to speak, in the mountains of North Carolina, will be that of the Spring Meeting of the Society at Asheville in April. Note: "Asheville in April" is the word—pass it along.

Kenilworth Inn with its inviting atmosphere, great foyer, and adjacent lounge; its immense open fireplace of old-time character and proportions, with cozy inglenook and high-backed English walnut settles, occupying—*i. e.* the inn, not the settles—an exclusive site upon a high plateau, completely encircled by the Appalachian Mountains, will be ours for the time being.

From Wednesday morn until Friday when some will feel the urge to catch the afternoon trains, all sessions—save only one perhaps, and excepting also, of course, the motor drives into the beautiful mountains, or golf, horseback riding, or the horse show—will be held in this famous tourist hotel equipped to accommodate comfortably 400 to 500 guests and harmoniously accentuating both the magnificent picturesqueness and romantic charm of its environment while affording its guests every luxury and convenience of modern invention. (For this and other data, see Chamber of Commerce literature.)

But all thought of joking aside, Asheville is certainly a beautiful place in the "Land of the Sky" and if you only can steal away for a day or two our Southern friends will surely make the Spring Meeting a wonderful success. "Asheville in April"!

April 20, 21, 22

Study and Travel Abroad

JOHAN R. FREEMAN, Past-President of the Society, recently gave the Society \$25,000, the income of which is now available and by decision of the Committee having the Fund in charge, and of the Board of Direction, the sum of \$1,800 will be given to some deserving one as a traveling scholarship.

The amount is substantial enough to make practicable a real period of study in the University laboratories abroad. It is intended to be effective on June 1st of this year, and those interested should not delay in learning the details and in making application.

More complete data may be found on page 60 of the Proceedings, "Part 1," of this month.

"Membership Work"

THE "membership work" done by the Board of Direction—much of it with the very valuable assistance of the many local membership committees now functioning in almost every part of the country—is larger than one would at first suppose.

The net increase in membership in 1926 was 721, but the Board acted upon 1486 applications for admission and transfer. Of these, 1194 applications were for admission and 292 for transfer. Not all admission applications resulted in membership, however. Some applications were denied and, in other cases, the prospective members failed to qualify by the payment of the initiation fee and the first year's dues, so that only 1033 actual new members were admitted.

There were 39 reinstatements, consequently were it not for losses the growth would have been 1072. Of the losses, 163 were dropped for non-payment of dues; 109 died; 77 resigned; and 2 were expelled; a total loss of 351, which leaves 721 as the net gain for the year.

Items of Interest

FOR those interested in what the Society is doing, Proceedings of this month contains many items that will warrant attention.

The Annual Reports of the Board of Direction, Secretary, and Treasurer, printed in full, contain within their 23 pages mention of the more



I enclose a photograph of the portion now standing of the Pont St. Benezet which was taken by myself in September, 1924. This bridge is across the Rhone at Avignon, in Southern France—at least it crosses a part of the Rhone, the original right hand portion of the bridge having been destroyed. The chapel in the middle is said to contain the remains of St. Benezet.—Charles M. Spofford

formal matters: 57th Street Property, Student Chapters, The Technical Procedure Committee, Membership, Meetings of the Board, the Society, and the several Technical Divisions; the Library, the Reading Room, the Employment Service, Publications, and Finances.

The Minutes of the Meetings of the Board of Direction held on January 17, 18, and 20, as abstracted, show a number of subjects dealt with: Allocation of the Interest of the Freeman Fund, Adoption of a Code of Professional Practice, Allotment of Unequal Amounts to Local Sections, etc.

Taken all in all, this month's Proceedings is about as full of items of Society matters as may be expected until the next Annual Meeting.

Tau Beta Pi

A Student Organization for the Advancement of Engineering Ideals

By D. M. Burmister, Columbia '28

IN 1885, Professor E. H. Williams, Jr., then head of the Mining Department at Lehigh University, initiated a student organization which has since become the outstanding honorary society of engineering students—Tau Beta Pi.



Emblem of Tau Beta Pi in the form of the cap, sill and posts of a trestle bent

Unlike other honorary societies, Tau Beta Pi is strictly a student organization. All the chapter officers are undergraduates at their respective colleges.

To meet its objectives and traditions the society must band together men who not only possess high scholastic ability, but also only such as can and will work together to advance engineering ideals. Thus, while election to membership is based on high scholastic standing, it has al-

ways been recognized that good fellowship, also, is to be a fundamental characteristic.

Elections are made at three periods. Three members of the Junior class may be elected at the beginning of their Junior year—an honor to be won only by men of the highest type. At the end of the Junior year those in the highest eighth of the Junior class are eligible for election and, at the beginning of the Senior year, those in the first quarter of the class become eligible.

The Parent Chapter of Tau Beta Pi existed alone until 1892, when the Alpha Chapter of Michigan was founded. The Columbia Chapter, Alpha of New York, was founded in 1902. Since then, Tau Beta Pi has grown until now there are 48 chapters and more than 13,000 members, with alumni associations in the larger cities.

"The Bent," devoted to the best interests of Engineering Education and the Profession of Engineering, for the promotion of which Tau Beta Pi exists, is the official organ of the Society, published quarterly.

Student Badges

MEMBERS of Student Chapters will doubtless be interested to learn that it has been decided to issue no student badges to Freshmen. Only a few of the Student Chapters admit Freshmen to membership, but there are some that do.

The first year's work in an engineering school of recognized standing is usually confined to subjects of a general or mathematical character, and it is felt that while it is desirable to encourage those first-year men who are to stay through and pursue civil engineering courses, it is not wise to mark them, even tentatively, as engineers until they have at least begun to specialize on engineering subjects.

Between Friends

EXTRACTED from a letter between two friends—both members of the Society—is the following:

"A recent study of a water power project here in the mountains proved most interesting. Hydro developments here are unique in that water is very scarce, whereas fall is plentiful. This project presented the opportunity for the development (through 3 power houses) of 4,100 feet fall in 14 miles.

"Again the entire region is marked by comparatively recent volcanic flows, massed in motley and complicated arrangement. These have diverted the little drainages from the melting snows to one new course after another and there result quite interesting problems in harnessing the potential energy which is theirs. One elusive stream disappeared below surface four times, and reappeared as often, as I followed its course to a point where it seemed the waters might be best utilized.

"Storage reservoirs are seldom advantageous on account of excessive evaporation. Observations which we have made would indicate a higher average evaporation rate in this region than at any of the Reclamation project stations mentioned in Mr. Houk's paper in January, 1926, Proceedings. There is practically no rainfall save at points above 10,000 feet elevation, and there it rains a little during the summer months. The mountain streams are remarkably constant in their flow throughout the year, however, so that the storage reservoir is not an important requirement here as in more humid regions.

"Jim wrote some months ago. A sparkling sheet of wit it was, recalling experiences when we were rodmen over fifteen years ago.

"With best wishes to Mrs. ——— and yourself,

"Sincerely yours, _____"

America to Japan

IN response to the request in the January issue for a copy of Vol. 88 of Transactions, Mr. Harry S. Hodge, of University P. O., Va., writes: "I am sending by this mail copy of Vol. 88, Transactions. Will

you kindly forward same to the Member resident in Japan with my compliments."

His offer was accepted and promptly the book started on its journey to Japan.

Mr. Hodge was one of those who on December 31st last had completed 35 years' affiliation with the Society as a Corporate Member and whose name was added to the "Roll of Honor."

The Mimeograph

WHILE the membership in general sees announcements only in neatly printed form, those who are participating actively in the work of the Society are asked to content themselves with the more informal mimeograph.

Last year 197 mimeograph communications were issued—as to the Local Sections, the Student Chapters, or their Faculty Sponsors, to the several general committees, or to the Board of Direction.

Many of these communications, as for instance, the minutes of the Board of Direction, with the committee reports and other appendices, are many pages long, and for the Technical Divisions the edition is sometimes quite large.

Separate stencils cut last year numbered 1077 and the total number of pages issued was 52,411. The bill for mimeograph supplies in 1926 was more than \$600, but even that is much cheaper, and it is also quicker, than printing.

Meetings

I WANTED to hear B——'s paper," said one prominent engineer when commenting on a recent meeting. "I was able to be there only that one morning but wanted to know what he had to say."

The paper referred to undoubtedly will be printed for the information of the membership but this man, himself a leader in the profession, was willing to travel some 500 miles to learn as promptly as possible the ideas of another advanced thinker. He wanted to keep well abreast of the times.

Don't Be Bashful

WHY any member should be reticent about filing his professional record with the Society is hard to fathom. During five years, only 4,500 members have seen fit to keep their records up-to-date.

A student of psychology might find the question an interesting one. If this information were desired for use as publicity or to satisfy idle curiosity, that would be another matter. The fact is, the Society merely wants these data for the members' own good.

An inquiry comes in, perhaps from the Employment Service. It may be a hard specification to fill—particular education, limited age, location in a given city, or what not. Clearly the Employment Service is "up against it", and immediately appeals to the Societies, which may or may not be able to furnish the information, depending on the amount of experience data available.

There is the possibility that these records may be anywhere up to five years old. Another source of information is the classification cards on which each member is supposed to have indicated his specialty. If a few names can be gotten from this process, again the professional records are culled.

The usefulness of these records and their value to each member is great. But how complete are they? Since last November when an entire new set of blanks was sent to the membership, some 12,000 or more, only 2,000 have been returned, of which about 1,000 are renewals from members who furnished similar information at the previous circularization.

This is not a very impressive showing; nor is it encouraging to any one who is trying to make use of the records for the benefit of members.

Perhaps you are one who has failed to "obey that impulse." Perhaps you are the very one whose name is needed in connection with some fine opening. Just hunt up the blank-form for the biographical and professional record, fill it out and return it. Give the Society the benefit of this information. If you have misplaced it, a post card to the Secretary will bring another by return mail.

March Proceedings

THE fact that the civil engineer has an important rôle to play in the construction of electric power stations is well attested in the two papers given in the March Proceedings covering details of civil engineering work on two of the latest and largest power plants built in the vicinity of New York City.

The titles of the papers are "Civil Engineering Features of the Hell Gate Station", by Ernest M. Van Norden and George A. Hughes, Members, Am. Soc. C. E., and "The Civil Engineering Features of the Kearny Power Station", by Roman von Fabrice, Assoc. M. Am. Soc. C. E.

These papers, originally presented before the Power Division at the 1926 Annual Meeting, show the variations in methods of handling two quite similar problems. Both papers carry the reader from the early investigations through the design and construction process to the finished plant and its operation. Extensive drawings and photographs in each case add no little to the attractiveness to the narratives.

Discussions in the March Proceedings number 16 and deal with 11 papers already presented before the Society. In addition, 4 memoirs of deceased members complete the volume.

Certificate Plan

FOR the second consecutive year the certificate plan was a success at the time of the Annual Meeting.

This plan is not operative unless or until 250 certificates have been deposited with the validating officers, and although many members come to the meeting, not all secure the certificates, for one reason or another, so that there is always the danger that the plan will fail.

To the Pennsylvania members belongs the credit for the greatest number of certificates. They turned in 70 and incidentally saved for themselves on the return fare approximately \$300. New York State turned in 51 certificates (these from points beyond the commuting zone), Massachusetts 31, Connecticut 24 and Washington, D. C., 19.

It is to the smaller number of men who come longer distances, however, that the success of the plan means

most. To the members who come from Illinois, for instance, there was saved more than \$150. Those from Missouri saved over \$124. Those from Ohio saved \$113. Those from Detroit saved almost exactly \$100—not each one but all together.

It is a long trip from Los Angeles to New York and the saving of one-half return fare is worth having. So, also, it is from Salt Lake City, or Texas, or Birmingham or Jacksonville and to those members who traveled from these localities the success of the plan means much.

Expert Testimony

THE detailed advice relative to expert testimony as given by Mr. Franklin Nevius, a successful lawyer skilled in cases involving engineering and contract matters, is well worth readings as printed in "Part 1" of these Proceedings on page 61.

Do you always make sure that your qualifications as an expert witness on the matter in hand are properly set forth? Do you find yourself giving the appearance of an advocate rather than of one unbiased and in a position simply to explain effectively to Court or jury the technicalities involved? Do you get your ideas over in words of one syllable or expressed so as to be thoroughly comprehended?

Mr. Nevius has certain thoughts on these subjects that should be of great help to members who have occasion to act at times as expert witnesses. His speech originally was before the American Institute of Consulting Engineers and upon request he has "boiled it down" into the form of a letter which, as stated, is worth reading.

The Brotherhood of Bridge Builders

(Continued from page 1)

as chief bridge builder. This title, however, was that given to the head of one of the great priestly Roman orders, therefore antedating the period of the Pontist Brothers.

One authority considers that the word "pons" originally meant "path" rather than bridge, especially the path between man and the gods, and that the Pontifex kept this path open.

Later careful research has disclosed that there was probably no definite association between the various groups of "Brothers of the

Bridge" and that no real evidence exists of a unified religious order bound by perpetual vows and devoted to the construction and maintenance of bridges.

The Pont St. Benezet at Avignon, a famous bridge of this period, is a stone arch structure having originally a total length of approximately 3000 feet. This bridge, across the turbulent Rhone, was begun in 1177 and completed in 1185, a record not greatly surpassed by our modern bridge builders. A portion of this bridge still stands, including a chapel which is said to contain the body of St. Benezet, and on account of this fact to have escaped destruction by floods and war.

The Pont St. Esprit, another important bridge of the period, across the Rhone about twenty-five miles north of Avignon, was begun in 1265 and required forty-two years for its construction. The pier foundations for this bridge are said to have been of the pile and grillage type instead of the more primitive rock mounds previously used.

Ten miles from Avignon is the famous "Pont du Gard", built by the Romans to furnish water for the baths at Nîmes. This aqueduct is today, 2000 years after its construction, in better condition than the bridges of St. Esprit and of St. Benezet. The Pontist Brothers of Avignon revived the Roman art of Bridge Building but did not attain the same proficiency.

Tradition ascribes the construction of both the Pont St. Esprit and the Pont St. Benezet to divine aid. The story of various marvels relative to Pont St. Benezet is preserved in a parchment record at the City Hall at Avignon. M. Bruguier-Roure, the French archeologist, ascribes little credit to these papers, believing them to be the writings of a young monk more anxious to exploit the miraculous building of the bridge than to make an historic record.

He expresses his admiration for the builder in the following terms: "Even if this appreciation of St. Benezet is admittedly overdone, his work would only be the more astonishing. Separated from the supernatural, you would have only visible man, whether monk or layman, who, in his struggle against the elements and the imperfections of science, accomplished in a small amount of time a work considered beyond ordinary forces by contemporaries."